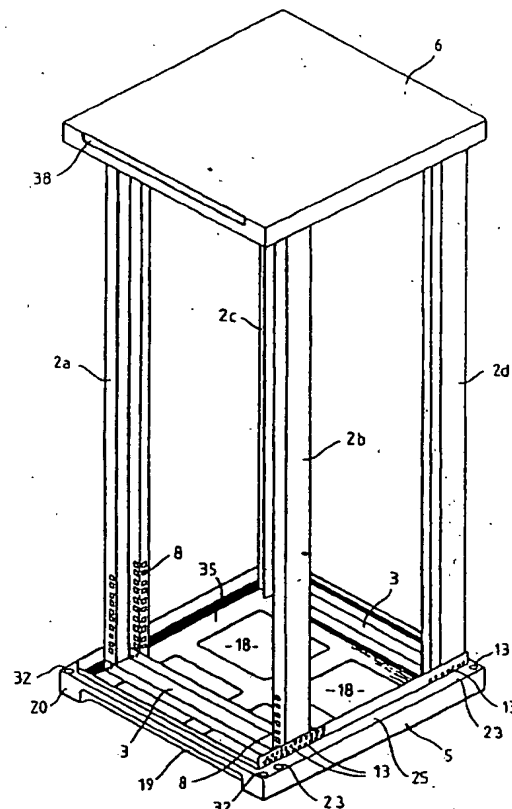


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: H05K 5/00, 7/18, A47B 47/03	A1	(11) International Publication Number: WO 95/17803 (43) International Publication Date: 29 June 1995 (29.06.95)
(21) International Application Number: PCT/NZ94/00145 (22) International Filing Date: 20 December 1994 (20.12.94) (30) Priority Data: 250521 20 December 1993 (20.12.93) NZ (71)(72) Applicant and Inventor: HOBDAV, David, Stephen [NZ/NZ]; 12 Onedin Place, Titirangi, Auckland (NZ). (74) Agents: HAWKINS, Michael, Howard et al.; Baldwin, Son & Carey, 342 Lambton Quay, Wellington 6001 (NZ).		(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, SK (Utility model), TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ). Published <i>With international search report.</i>

(54) Title: EQUIPMENT CABINETS AND METHODS OF MANUFACTURE**(57) Abstract**

This invention relates to an equipment cabinet for the containment of electrical equipment with the mounting racks for carrying the shelves to in turn carry the equipment being formed into portal frames with additional support members. The base and top panel sections provide integrity transverse to the portal frames formed from the mounting racks. The side covers and doors are then provided as non structural elements to enclose the cabinet. The cabinet also provides an access in the base for ground laid cables. The cabinet construction overcomes the need for the side panels to carry any significant load and allows for simplicity of construction and assembly on site.



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EQUIPMENT CABINETS AND METHODS OF MANUFACTURE**BACKGROUND****(i) FIELD OF THE INVENTION**

This invention relates to equipment cabinets and methods of manufacture and, in particular, although not necessarily solely, cabinets for the containment of electrical equipment such as modems, routers and other communications equipment.

(ii) DESCRIPTION OF THE PRIOR ART

Prior art electrical equipment cabinets utilise structural cabinets often of welded construction having substantially vertical mounting frames for mounting shelves or trays to support the enclosed equipment. The mounting frames themselves provide a series of fixing points for the fixing of shelving units and act as columns to pass the load from the shelves on to the structural cabinet and/or on to the base of the cabinet. However, these prior art cabinets do not utilise the frames for the structural integrity of the cabinet itself. Instead, the prior art cabinets provide a welded or bolted outer structure and merely use the mounting racks for the cartage of the shelving loads.

The welded or bolted construction of the prior art cabinets can be seen as a disadvantage over a cabinet of purely bolted construction and where the utilisation of the mounting frames as structural elements for the cabinet itself decreases the need for welded joints between panels of the cabinet and also reduces wall thickness and complexity of the panel construction.

Further problems with prior art cabinets have arisen through the non-provision of access for cables entering or exiting the cabinet at ground level to progress along the floor. Conventional cabinets have provided access through the base of the cabinet for cables through apertures in the floor beneath the cabinet and this is undesirable in some situations where a raised floor is not used or the associated equipment outside the cabinet may be of a temporary nature and it is desirable to have a cable simply laid over the floor and accessible to the equipment within the cabinet.

OBJECT OF THE INVENTION

It is an object of the present invention to provide an equipment cabinet and a method of

manufacture which overcomes some of the disadvantages of the prior art or at least provides the public with a useful choice.

SUMMARY OF THE INVENTION

Accordingly, in a first aspect the invention consists in an equipment cabinet comprising at least first and second portal frames wherein each frame contains two substantially vertical mounting frame members and wherein said portal frames are interconnected at or adjacent their bottom ends by a base section and interconnected at or adjacent their top ends by a top section and side panels or doors to enclose said portal frames.

Accordingly, in a second aspect, the invention consists in a method of manufacturing an equipment cabinet comprising:

constructing mounting frame members to be interconnected by support members to form first and second portal frames;

interconnecting said portal frames with top and bottom panels; and

fitting side panels or doors to enclose said cabinet.

Accordingly, in a third aspect, the invention consists in an equipment cabinet having a top section, base section and enclosing side panels or doors and wherein an aperture is provided in a side of said cabinet adjacent the base for the entry of floor laid cables in to said cabinet.

BRIEF DESCRIPTION OF THE DRAWINGS

Other aspects of this invention which should be considered novel will become apparent from the description with reference to the following drawings in which:

Figure 1: Is a perspective view of an equipment cabinet in accordance with one embodiment of this invention and without side covers or doors;

Figure 2: Is a perspective view of the interconnection between a mounting frame, support member and base section of the embodiment of Figure 1;

Figure 3: Is an elevational view of the apparatus of Figure 1 with a side cover fitted;

Figure 4: Is an elevational view of the apparatus of Figure 1 showing a door fitted to the apparatus of Figure 1; and

Figure 5: Is an elevational view of part of the apparatus of Figure 1 showing the top of a mounting frame member, top support member and top section.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the apparatus shown in Figure 1, the apparatus comprises an equipment cabinet 1 without the side covers or door panels fitted for clarity. The cabinet includes mounting frame members 2 comprising two opposed pairs of mounting frame members being a first pair 2A and 2B and a second pair of mounting framing members 2C and 2D.

Each pair of mounting frame members 2A and 2B, 2C and 2D are interconnected at a lower end by a first support member 3 and, as shown in Figure 5, at a top end by a second support member 4.

The mounting frames in each pair such as mounting frame members 2A and 2B and the first support member 3 and second member 4 complete a portal frame to provide the main structural integrity to the cabinet itself. In

this manner, two portal frames are constructed within the cabinet and are then provided with a base section 5 and top section 6 in such a manner as to prevent racking of the two portal frames in a plane transverse to the main plane of the portal frames themselves.

In this preferred embodiment, the first and second support members 3 and 4 are provided as additional channel sections or other structural members to provide a completed frame. It is envisaged that such support members could be incorporated as part of the base or top section 5 and 6 if desired.

Each of the mounting frame members 2 provide a series of fixing points 8 along their lengths although only a portion of these fixing points are shown in Figure 1. The fixing points 8 allow for the fitment of shelves and other attachments within the complete cabinet 1 to carry the necessary electrical equipment.

As can be seen best by Figure 2, the connection between the mounting frame member 2A and its first support member 3 is a non-rotational connection 9 which in this preferred embodiment comprises bolts 10 passing through associated flanges of the channel sections comprising items 2A and 3.

Any convenient connection could be used provided the connection provides a non-rotational joint between these members to allow the portal frame constructed from these members 2A and 3 to act as a suitable structural frame.

As mentioned, in this preferred embodiment two bolts 10 are used through each side flange of the channel member 2A, however, screws, dowels or rivets could equally be used as well as any other similar structural connection that will provide the non-rotational joint.

It is intended that the non-rotational joint 9 be provided to resist rotation within the plane of the portal frame utilising members 2A and 3.

A series of fixing points may also be provided on the base section 5 and similarly on the top section 6 so that the portal frames may be connected to the base section 5 through the provision of two spaced apart bolts, screws, dowels or rivets 13 through the spaced part apertures 12.

Again, such a construction provides a non-rotational joint between the base section 5 and the mounting frame member 2 at or adjacent an end of the

mounting frame member 2 such that the completed construction resists rotation of the portal frame utilising mounting frame 2A and 3 in a plane transverse to that of the principle plane of the portal frame itself. The use of similar connections at both the connection between the portal frame comprising mounting member 2A and support member 3 and the base section 5 as well as the mounting frame member 2A support member 4 and top section 6 provides a structurally sound cabinet resistant to loads both in the plane of the portal frame and transverse to the plane of the portal frame.

As with the non-rotational joint 9, the connection between the base section 5 and, in this preferred embodiment, the mounting frame member 2A is a non-rotational joint of any convenient type which in this preferred form comprises two bolts 13 passing through the mounting frame member 2A and through the flange 15 of the base member 5.

As can be seen in Figure 5, a similar joint is provided between the top section 6 and the mounting frame members such as member 2B with a series of apertures 16 then provided in a flange 17 forming part of the top section 6 such that at least two bolts may be passed through the apertures and through the mounting member 2B to provide the non-rotational joint.

The base section 5 may be provided with apertures 18 in the floor of the base section 5 to accommodate the cables coming up through the floor or support surface on which the cabinet rests and entering into the cabinet. Similarly, an aperture 19 is provided in at least one side flange 20 of the base section 5 or equally in one of the side panels so that cables progressing along the floor or support surface on which the cabinet rests may enter in to the cabinet. It should be noted that this aperture 19 may be provided with a suitable foam or other material on the internal side of the aperture 19 so that cables may be pushed through the foam or similar material to enter into the cabinet and yet the aperture 19 is substantially closed to the entry of dust, dirt or other foreign material.

Referring now to Figure 3, side panels 22 may be fitted into the cabinet once the portal frames have been constructed and the base section 5 and top section 6 have been placed around the bottom and top ends of the portal frames.

In this preferred embodiment, the side panels 22 are provided with apertures 23 to locate on pins 24 provided on a receiving flange 25 to receive the lower end of the side cover 22. In this manner the side cover

may be lifted in to place and the pins 24 engage through apertures 23 to lock the base section in place.

The top end of the side cover 22 may then be rotated into place and located and locked with location means 26 and locking means 27.

In this example, the side cover 22 is of a width slightly less than the entire width of the base section 5 and top section 6 so that the door panels or front and rear panels of the cabinet 1 may be provided of full width to completely enclose the cabinet. Of course, this could be rearranged with the side cabinets being of full width and the doors nesting within the side panels 22.

As shown in Figure 3, the side panel 22 may be provided with suitable venting 28 as desired.

Figure 4 shows a door panel 30 which may be provided on both the front and rear sides of the cabinet 1. The door panel 30 may be located by pins 31 located within apertures 32 provided in the base section 5 and in the top section 6 such that the door 30 may pivot about the pins 31. A lock 34 may be provided to keep the door 30 closed when rotated to its closed position.

Figure 5 demonstrates the raised lid portion 6 of the preferred embodiment of this invention. The top section 6 may be connected to the mounting frame members 2 and support members 4 such that there is some clearance between the top panel of the top section 6 and the support member 4.

Such a connection detail allows for a sub-tray (not shown) carrying fans to be mounted on the support members 4 and be spaced from the top panel of the top section 6.

An aperture 38 may be provided in the top section 6 to allow for venting of this cabinet with the fans located within the sub-tray (not shown) drawing heated air from within the cabinet and exiting the air out aperture 38.

The solid top panel of top section 6 provides a drip proof lid to the cabinet while providing a duct between the sub tray (not shown) and the top panel of top section 6 to exit air out aperture 38.

Thus it may be seen that a cabinet is provided or relatively economic and simple construction requiring only bolting to construct and utilising the mounting frame members 2 as main structural elements of the

cabinet itself. Portal frames are constructed within the cabinet utilising the mounting frame members and then side panels or doors simply fitted about the exterior together with the base section 5 and top section 6.

Furthermore, the cabinet allows for ground laid cables and provides venting through the top 6 with the provision of fans in a sub-tray spaced from the top panel of the top section 6.

Where in the foregoing description reference has been made to specific components or integers of the invention having known equivalents then such equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof it is to be understood that modifications or improvements may be made thereto without departing from the scope or spirit of the invention.

CLAIMS:

1. An equipment cabinet comprising at least first and second portal frames wherein each frame contains two substantially vertical mounting frame members and wherein said portal frames are interconnected at or adjacent their bottom ends by a base section and interconnected at or adjacent their top ends by a top section and side panels or doors to enclose said portal frames.
2. An equipment cabinet as claimed in claim 1 wherein said substantially vertical mounting frame members forming part of each portal frame comprise two opposed channel section members.
3. An equipment cabinet as claimed in claim 1 or claim 2 wherein each portal frame further includes a first support member interconnecting the substantially vertical mounting frame members at or adjacent their bottom ends and a second support member interconnecting said substantially vertical mounting frame members at or adjacent their top ends.
4. An equipment as claimed in claim 3 wherein each interconnection between a mounting frame member and

a support frame member is resistant to rotation in the plane or the pair of substantially vertical mounting frame members.

5. An equipment cabinet as claimed in any one of the preceding claims wherein said interconnection between said base section and said portal frames and said top section and the portal frames resist rotation of said portal frames in a plane transverse to the plane through each pair of mounting frame members.
6. An equipment cabinet as claimed in any one of the preceding claims wherein said base section and said top section are provided as substantially rectangular sections encompassing the lower and top ends of said portal frames respectively.
7. A method of manufacturing an equipment cabinet comprising:

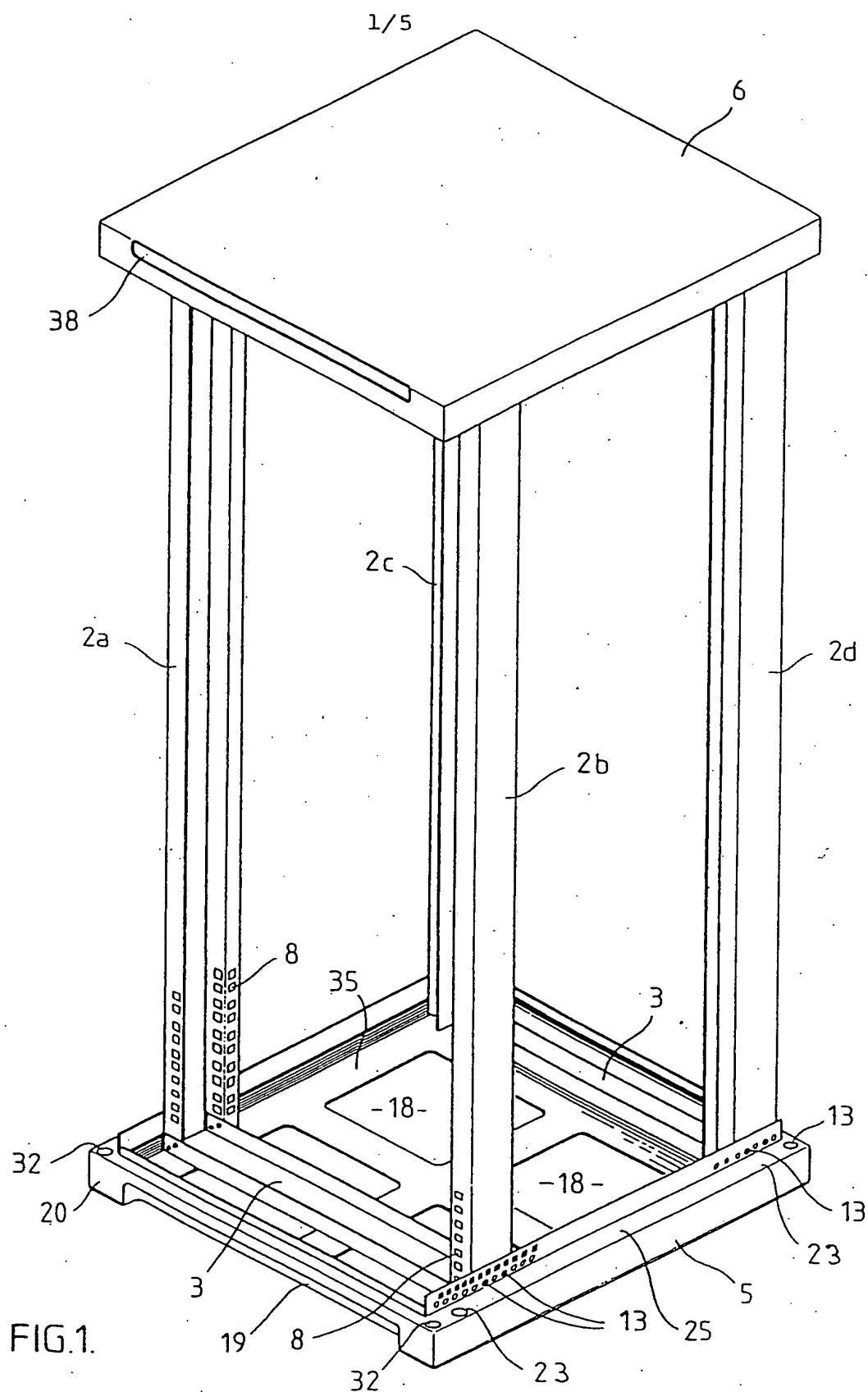
constructing mounting frame members to be interconnected by support frame members to form first and second portal frames;

interconnecting said portal frames with top and bottom panels; and

fitting side panels or doors to enclose the cabinet.

8. A method of manufacturing an equipment cabinet as claimed in claim 7 wherein said interconnections between said mounting frame members are connected to said support frame members to resist rotation in the plane of the resultant portal frame.
9. A method of manufacturing an equipment cabinet as claimed in claim 7 or claim 8 wherein said interconnection between said portal frames and said top and bottom panels comprises an interconnection to resist rotation in a plane transverse to the plane of said portal frame.
10. An equipment cabinet having a top section, base section and enclosing side panels or doors wherein an aperture is provided in a side of said cabinet adjacent the base for the entry of floor laid cables into said cabinet.
11. An equipment cabinet as claimed in claim 10 wherein said aperture is provided in an upwardly directed flange of said base section forming the lower portion of the side of said cabinet.

12. An equipment cabinet as claimed in claim 9 or claim 10 wherein sealing means are provided within or adjacent said aperture to seal about cables passed through said aperture and inhibit the entry of dust through said aperture.
13. An equipment cabinet as claimed in claim 12 wherein said sealing means comprises foam positioned within said cabinet and over said aperture.
14. An equipment cabinet substantially as hereinbefore described with reference to the accompanying drawings.
15. A method of manufacturing an equipment cabinet substantially as hereinbefore described with reference to the accompanying drawings.



SUBSTITUTE SHEET

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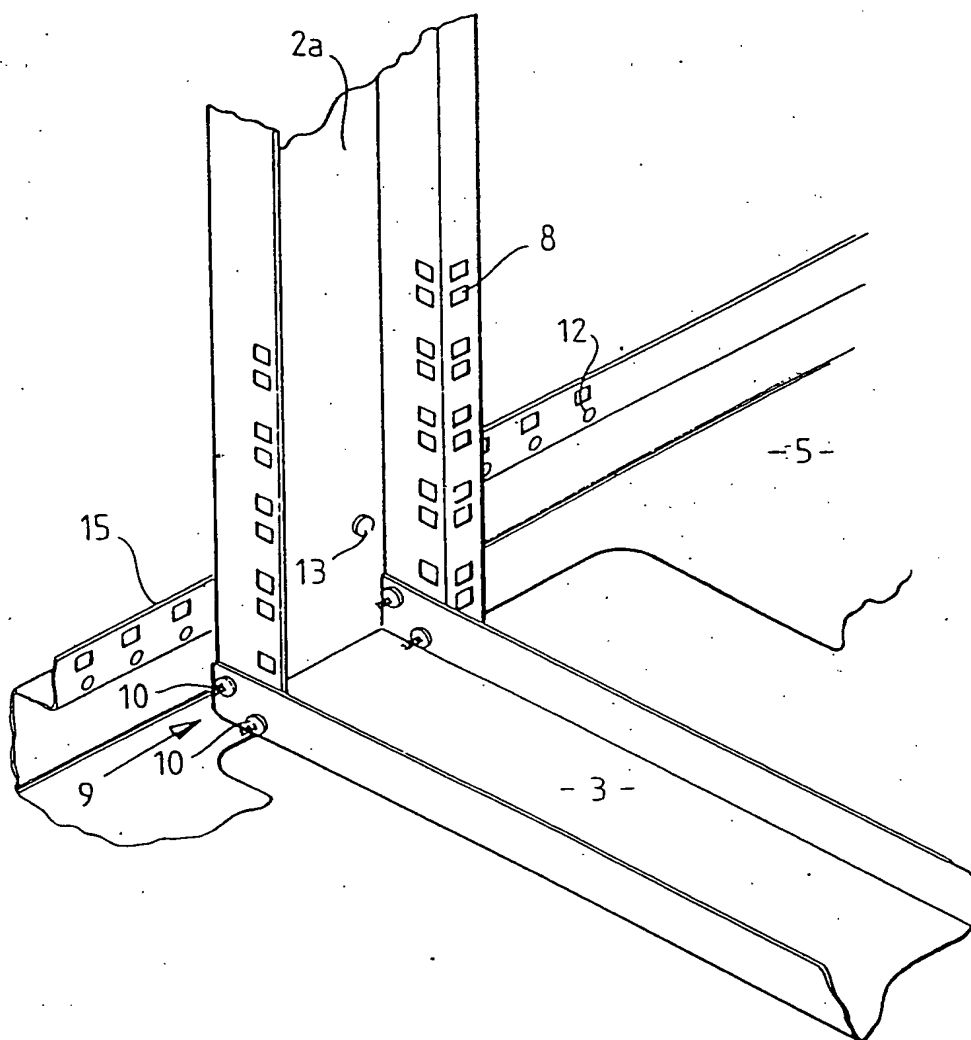
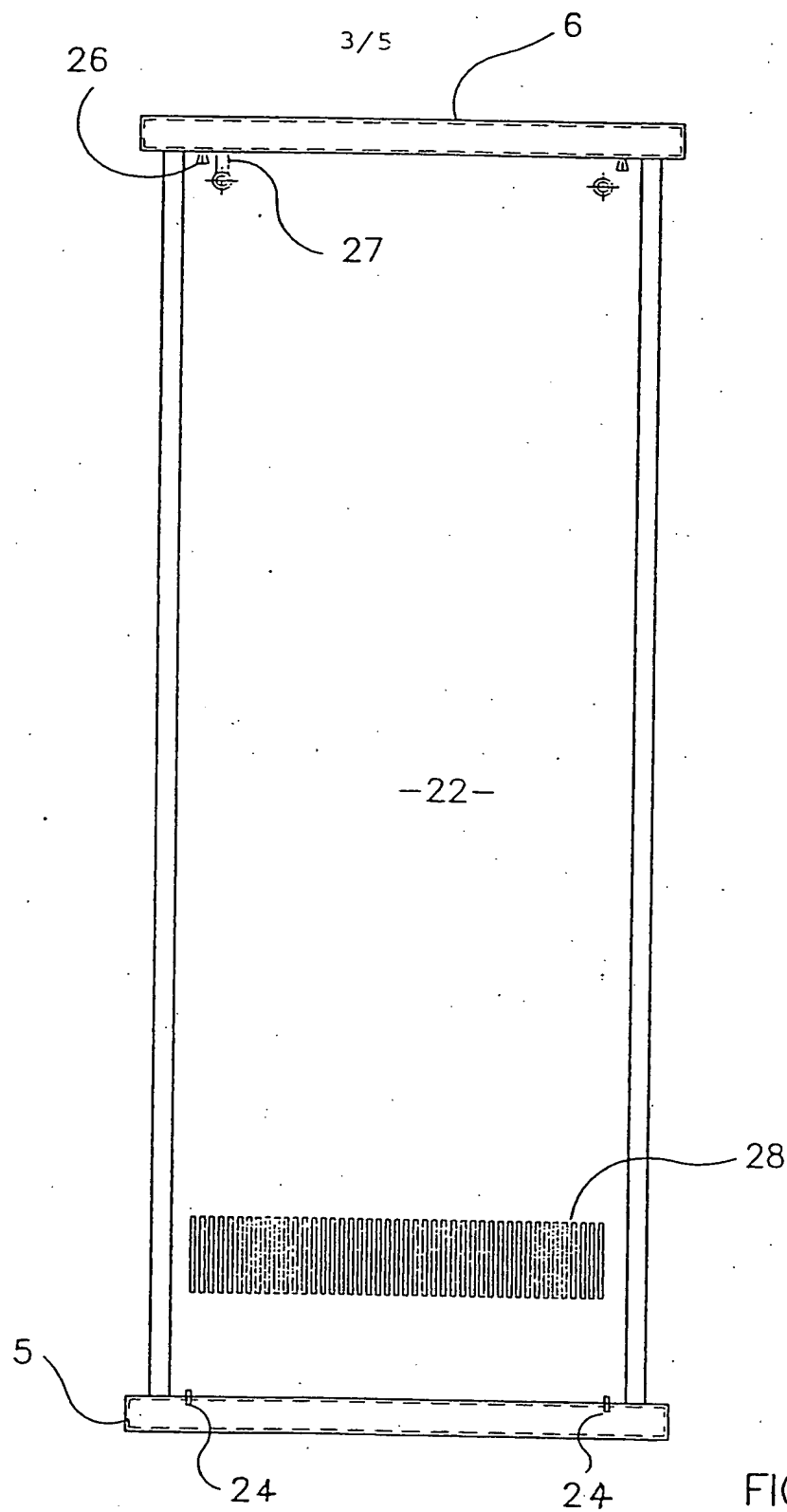


FIG. 2.



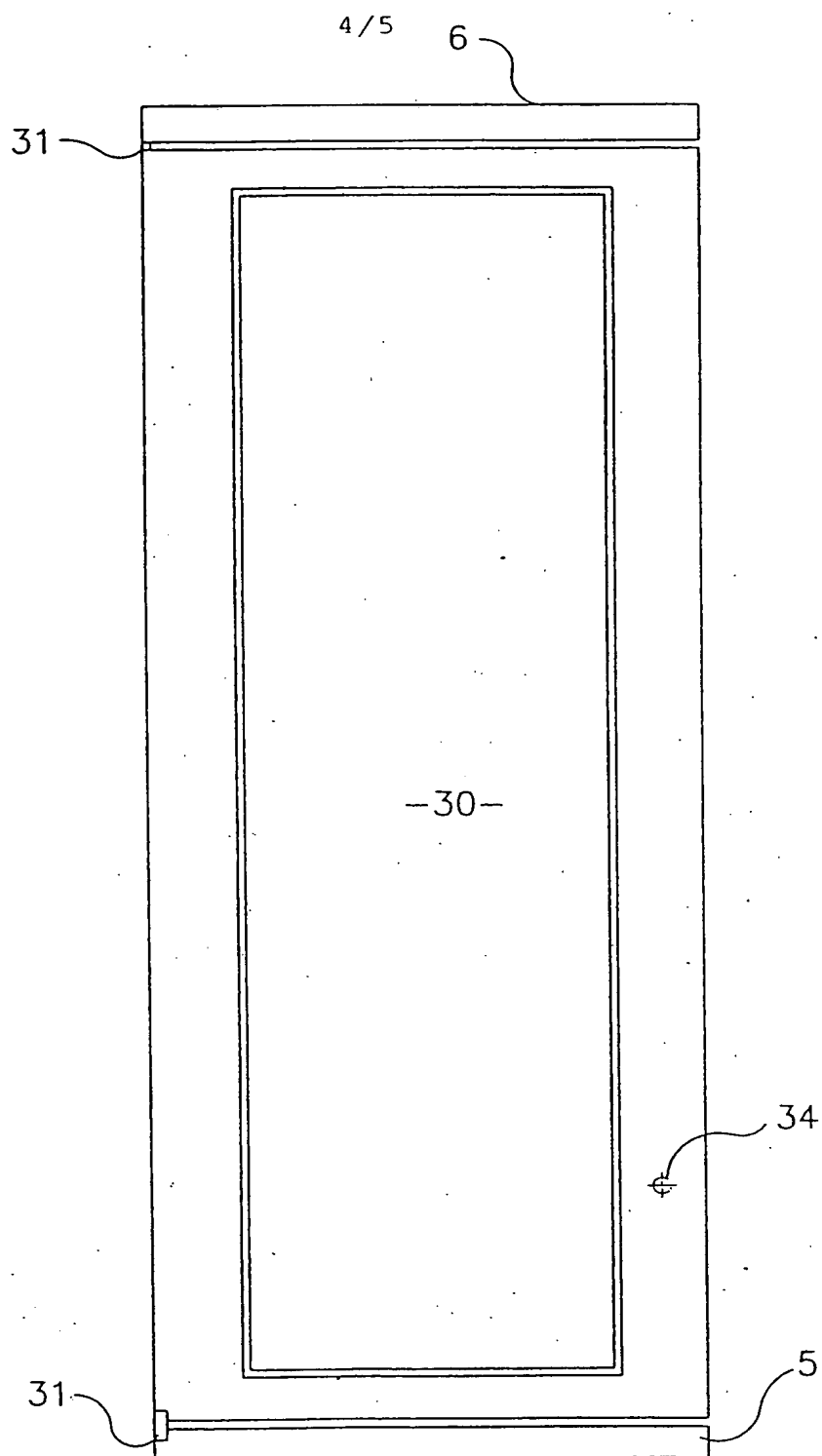


FIG. 4

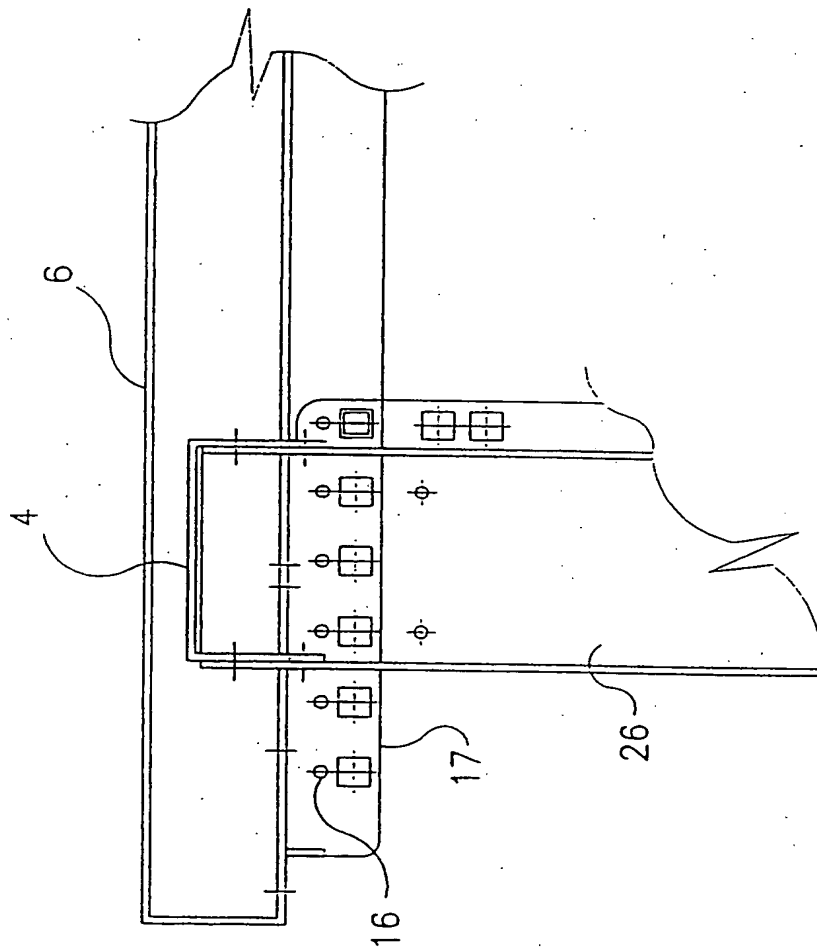


FIG. 5.

A. CLASSIFICATION OF SUBJECT MATTERInt. Cl.⁶ H05K 5/00, 7/18, A47B 47/03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H05K 5/00, 5/02, 5/04, 7/00, 7/18, A47B 47/02, 47/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	FR,A, 2079763 (MORVAN) 12 November 1971 (12.11.71) entire document	1-11, 14, 15
X	GB,A, 1069122 (GEORGE KENT LTD) 17 May 1967 (17.05.67) entire document	1-9, 14, 15
X	GB,A, 1158949 (ALFRED IMHOF LTD) 23 July 1969 (23.07.69) entire document	1-9, 14, 15
X	EP,A, 522252 (SCHIAVI S.R.L.) 13 January 1993 (13.01.93) entire document	1-9, 14, 15

☒ Further documents are listed
in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents :

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search
29 March 1995 (29.03.95)

Date of mailing of the international search report

12 APRIL 1995 (12.04.95)

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X	DE,A, 1937808 (ALLGEMEINER ELEKTRO-BAU) 4 February 1971 (04.02.71) entire document	1-9, 14, 15
X	DE,A, 3404349 (LICENTIA PATENT-VERWALTUNGS-GmbH) 8 August 1985 (08.08.85) page 12 line 23- page 16 line 8, Figs. 1-9	1-9, 14, 15
X	WO,A, 91/13577 (GRAF) 19 September 1991 (19.09.91) page 7 line 14- page 10 line 14, Figs. 1-5	1, 3-9, 14, 15
X	US,A, 1631718 (CAMPBELL) 7 June 1927 (07.06.27) entire document	1, 5-9, 14, 15
X	GB,A, 2154855 (THATCHCODE LTD (UK)) 18 September 1985 (18.09.85) page 1 line 111- page 2 line 56, Figs. 1, 2	10, 11, 14
P,X	WO,A, 94/19850 (KNURRMECHANIK FUR DIE ELEKTRONIK A.G.) 1 September 1994 (01.09.94) entire document	1-9, 14, 15
P,X	DE,A, 4412462 (SIEMENS AG) 13 October 1994 (13.10.94) entire document	1-9, 14, 15

Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international search report has not established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1-9: An equipment cabinet comprising two portal mounting frames interconnected by top and bottom sections with side panels or doors to enclose the frame.

Claims 10-13: An equipment cabinet having top, bottom and side panels or doors with an aperture in the cabinet side to provide entry to floor laid cables.

These groups of claims are linked by the features of a cabinet having a top, bottom, sides and doors. As these features are very well known in any cabinet, they are not considered to be special technical features. As such, there is no technical relationship between the inventions claimed, as there are no common special technical features which define a contribution that each invention makes over the prior art. Consequently, there is no unity of invention.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

This Annex lists the known "A" publication level patent family members relating to the patent document cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
FR	2079763						
GB	1158949	CH	476475	DE	1778050	FR	1556891
EP	522252						
DE	1937808						
DE	3404349	AT	36213	EP	151478		
WO	9113577	AT	114427	AU	73328/91	CA	2076751
		DE	4006874	EP	523063	HU	61451
		US	5372075				
GB	2154855						
WO	9419850	BR	9400666				
DE	4412462						